Japanese Patent Laid-Open No. Sho 56-27509

Japanese Patent Laid-Open Date: March 17, 1981

Japanese Patent Application No. Sho 54-103704

Japanese Patent Application Date: August 15, 1979

Applicants: Pioneer Corporation

SPECIFICATION

1. Title of the Invention

Shield Type Loop Antenna

2. What is Claimed is:

(1) A shield type loop antenna obtained by annularly bending a coaxial cable having an internal conductor and an external conductor surrounding the internal conductor and being annular in cross-section, using an end of the internal conductor as an input/output terminal, and grounding the external conductor.

(2) The shield type loop antenna according to claim 1, wherein the coaxial cable is a semi-rigid cable.

3. Detailed Description of the Invention

The present invention relates to antennas and more particularly to a shield type loop antenna.

Figs. 1(a) and 1(b) schematically illustrate an equilibrium-shield type loop antennal and a nonequilibrium-shield type loop antenna, respectively. The equilibrium type antenna is such that a thin internal conductor 1 forming the equilibrium type loop antenna is entirely covered by a nonmagnetic shield pipe 2 made of a copper pipe or the like and grounded to be electrostatically shielded. The shield pipe 2 is cut at a

position A opposite an input/output terminal-taken-out position. Both ends of the internal conductor 1 serve as input and output terminals 3, 3' for outgoing and received signals. A dielectric layer 4 is provided between the internal conductor 1 and the shield pipe 2. Further, it is desired that the cut portion A be buried with an insulator (not shown).

On the other hand, the nonequilibrium antenna is such that the internal conductor 1 has one end serving as a single input/output terminal 3, extending inside the shield pipe and terminating at the cut portion A, and has the other end conductively connected to an end 5 of the remaining half of the shield pipe.

The shield type loop antenna described above has conventionally been obtained by first annularly bending a copper pipe and inserting a columnar inductor buried with a core serving as an internal conductor into the copper pipe thus bent.

However, obtaining the shield type loop antenna by such a manufacturing method described above poses a problem of an increase in manhours and cost-up derived from poor workability and of increased variations in impedance of the antenna thus obtained.

Accordingly, it is an object of the present

invention to provide a shield type loop antenna that solves the problems of such conventional art, is manufactured at low cost and exhibits an impedance characteristic small in variations.

A shield type loop antenna according to the present invention is obtained by annularly bending a coaxial cable, such as e.g. a semi-rigid cable, having an external conductor annular in cross-section and using an internal conductor as an antenna.

Figs. 2(a) and 2(b) schematically illustrate an equilibrium-shield type loop antennal and a nonequilibrium-shield type loop antenna, respectively, according to the present invention. The equilibrium type antenna shown in Fig. 2(a) is almost similar to the conventional one in terms of configuration. However, it is obtained by annularly bending a coaxial cable having an external conductor 2 annular in cross-section such as a semi-rigid cable and pulling out both ends of an internal conductor 1 of the coaxial cable at a given length, using them as input/output terminals 3, 3'. In addition, a cut portion A is formed by cutting the external conductor 2 by a desired width.

For the nonequilibrium loop antenna shown in Fig. 2(b), an internal conductor 1 is cut at a cut portion A

and its end is conductively connected to an end 5 of the right half external conductor. An internal conductor 2' is left as it is at the right half, semicircular portion. However, since both the ends are electrically opened, the internal conductor 2' will not exert an influence on the other portions.

A specific description is hereinafter made of a loop antenna manufacturing method according to the present invention with reference to Figs. 3(a) and 3(b).

First, a semi-rigid cable having a predetermined length is prepared as shown in Fig. 3(a). One portion of the central portion of the semi-rigid cable is notched, the internal conductor is cut and one end of the internal conductor is drawn out. The external conductor and dielectric layer of one end portion are cut out by a predetermined length to leave the internal conductor. Thereafter, as shown in Fig. 3(b), the semi-rigid cable is annularly bent to provide a nonequilibrium-shield type loop antenna.

Apparently from the description as above, the shield type loop antenna according to the present invention can be obtained by molding the coaxial cable as it is; therefore, an impedance characteristic has a few variations and manufacture is easy, resulting in low cost.

4. Brief Description of the Drawings

Figs. 1(a) and 1(b) are schematic views illustrating existing shield type loop antennas. Figs. 2(a) and 2(b) are schematic views illustrating shield type loop antennas according to the present invention. Figs. 3(a) and 3(b) are schematic views illustrating manufacturing processes for providing the shield type loop antenna according to the present invention.

Description of reference symbols of major portions

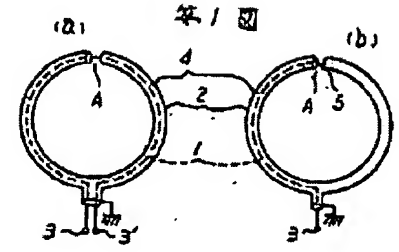
1 Internal conductor

2 shield pipe

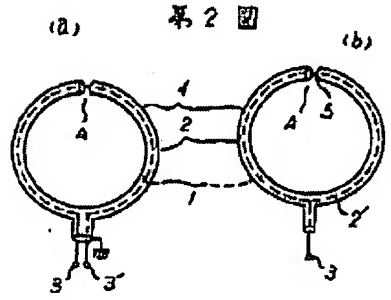
3, 3′ input/output terminals

4 dielectric layer

[Fig. 1]



[Fig. 2]



[Fig. 3]